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THE ADVANCED CZECH TECHNICAL SCHOOL

Prague, 1936-1937

The following retired during the last school year: Engineer Dr. of Technical Sciences honoris causa Karel Novak, of the Advanced School of Machine and Electro-technical Engineering. Professor of Theory and Electric Machinery Construction and Contract Professor of Heating and Ventilation Engineer Dr. of Technical Sciences Frantisek Srbek of the same institution; of the Advanced School of Agricultural and Forestry Engineering, Engineer Dr. of Technical Sciences honoris causa Gabriel Jirsik, Professor of Forest Economy and Applied Forestry Geodesy. Of the Advanced School of Chemical And Technological Engineering, Engineer Vaclav Fric, advisor of scientific institutions.

Newly appointed personnel: at the Advanced School of Engineering Construction of the Central Technical Council of the Capital City of Prague, Engineer Emanuel Snizek, as a professor of hydraulics, drainage, water technology, and the principles of water construction and water economy. At the Advanced School of Architecture and Agricultural Construction, Engineering Architect Dr. of Technical Sciences Vojtech Krch was appointed university lecturer in architecture and dry-land construction; at the Advanced School of Machine and Electro-technical Engineering, Engineer Dr. of Technical Sciences Josef Stransky was appointed university lecturer in radiotechnology, and at the Advanced School of Chemical-technological Engineering, Engineer Dr. of Technical Sciences Jaroslav Chloupek was appointed university lecturer in physical chemistry.

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An honorary doctorate in technical sciences was awarded to the distinguished Jugoslavian engineer Nikolov Teslov in appreciation of his world renown and his special services in the development of electric technology, on the occasion of his eightieth birthday. Honorary doctorates were also given to Vaclav Rosamov, head of the training plant for agriculture in Uhrineves and Professor of the Advanced School of Agricultural and Forestry Engineering Engineer Gabriel Jirsikov by the Advanced School of Agriculture and Forest Engineering. An honorary doctorate in technical sciences was awarded to Professor Engineer Dr. of Technical Sciences Alois Censky by the Advanced School of Engineering Construction.

Professor Engineer Dr. honoris causa Emil Votocek was elected an honorary member of the Associazione Italiana di Chimica in Rome and an honorary member of the Societe de Chimie Industrielle in Paris and was decorated with the order of Commander of the Legion of Honor. Professor Engineer Dr. of Technical Scimnces Jaroslav Milbauer was made a member of the Czech Academy of Sciences, and Professor Engineer Dr. of Technical Sciences Jan Satava, on the occasion of the 50th anniversary of the founding of an institute for the brewing industry in Ghent, was honored by the title of honorary professor of this institute. Professor Dr. Frantisek Kubec was elected a member of the scientific council of the Masaryk Academy of Labor; Professor Dr. Theodor Jesdik and Engineer Dr. Antonin Vlcek were made experts of the Masaryk Academy of Labor; Prof. Engineer Dr. Alois Kroulik was made a member of the Czechoslovakian Agricultural Academy in Prague; Professor Engineer Dr. Jan Smetana became a member of the Permanent Council

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of Seven of the Union for Water Experimentation; Professor Engineer Architect Karel Vavra was made Vice President of the Scientific Examination Commission for the Teaching of Drawing in Secondary Schools; Professor Engineer Frantisek Klokner became an honorary member of the Brotherhood of Czechoslovak Engineers; Professor Dr. Juntrich Svoboda and Professor Engineer Dr. Otakar Quadrat were decorated with the French order of Officer of the Legion of Honor.

The professors of our advanced school have made many trips abroad. Professor Smetana participated in a meeting of the International Society for Experimentation in Berlin, where he read three reports; Professor Vanecek undertook a two-month trip to England and France to study industrial and residence buildings and modern city planning; Professors Mendl and Krch participated in the International Congress of Architects in Paris; Professor Vavra and Dr. Mikuskovic concluded an official trip in western Europe; Professor Jares took part in the meeting of the International Experimentation Society in London; Professor Nachtikal attended the meeting on acoustics in Paris; Professor Votocek was at the meeting of the Societe de Chimie Industrielle in Paris; Professor Satava attended the meeting, Reunion internationale de Physique Chimie Biologie in Paris. Professor Milbauer made an official trip to Paris, Belgium, and Luxemburg; Professor Quadrat attended the meeting of the International Commission of Experts at the International Labor Bureau in Geneva and also represented our advanced school at the services in the memory of H. le Chatelier at the Sorbonne in Paris. He also attended the meeting of the Society for Industrial Chemistry in Paris; Professor Klika attended a meeting of the international committee Station Internationale Geobotanique in Lwow. Professor Kaisler completed a research trip in the Alps, and Professor Kroubik made one in Denmark; Professor Bilek attended international congresses at The Hague, Berlin, and Rome; Dr Zd'arsky and Dr. Tuma made an official trip to Paris, Dr. Vrbensky to Germany, and Professor Koukl to western Europe. Professor Svoboda attended an international conference on astrophysics in Paris and the fiftieth anniversary of the founding of the Societe Astronomique de France in Paris and represented our advanced school at the opening of the Czechoslovakian Pavilion at the International Exposition in Paris, where he also exhibited his apparatus for observing meteorites; Professor Rysavy attended a meeting of the International Federation of Surveyors in Paris; Professor Dusl made an official trip to France and spoke at the Instititute de Mecanique des Fluides in Lille; Professor Janko spoke at the International Congress for Insuring the Sick and at the International Congress of Actuaries in Paris; Professor Cada made an official trip to France and attended the meeting, Congress of French Professors Residing Abroad, and he represented us at Charles University at the International Conference of Higher Education in Paris. Professor Schneider, as acting vice-president of the International Society for Business Education took charge of the economic course of this society in Recke.

During the last school year Dr. Censky, Dr. Engel, and Dr. Vanecek helped the Ministry of Public Works by drawing up some building plans for Vitezny Square in Dejvice.

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On 22 March the 80th birthday of Professor Engineer Dr. of Technical Sciences honoris causa Jan Vladimir Hrasky was celebrated, and the 70th birthday of Professor Engineer Dr. of Technical Sciences honoris causa Karl Novak on 12 June.

In conclusion, I wish to express my gratitude to Dr. Emil Frank, Minister of Schools and National Education.

Professor Dr. of Laws Gustav Swamberg was born 2 September 1880 in Neveklov. He pursued his gymnasium course from 1891 to 1899 in Prague III and in Pribram, and he studied law from 1899 to 1903 in Prague and Vienna. He took his Doctorate of Laws at Charles University in 1904. He devoted himself originally to the legal profession and opposed the Habsburg regime as a young lawyer. From 1904 to 1910 he served in various courts in Prague and suburbs as a magistrate, and from 1910 to the revolution in the Prague commercial court. From 1906 to 1920 he also taught commercial law at the Czechoslovakian Commercial Academy in Prague, and from 1911 to 1915 at the Advanced Brewing School. After the revolution he was called to the legislative department of the Ministry of Justice. In 1920 he was appointed University Lecturer in legal sciences at the Advanced Commercial School founded in Prague in 1919. He became a full professor in 1922. He was three times dean of the Advanced Commercial School, in 1923-24, 1929-30 and 1933-34. There he lectured on commercial law, bills and notes, and particularly the legal forms of business organization, securities, contract law, transport law, banking law, and international and comparative commercial law. Besides this he carried on a legal practice and a seminar in private obligations. He is president of a commission for secondary state examinations in the field of banking and a member of all examination committees in the Advanced Commercial School, a member of the examination committee for insurance agents, for candidates for professorships at commercial academies, and for qualifying examinations for engineers.

He has written a series of articles and treatises in his own scientific field, especially in the periodical Czech Law, in Otto's Commercial Dictionary, in the Dictionary of Commercial Technology, Accounting, and Tax, in Czechoslovakian National Studies, and in the Savings Bank Review.

He published lithographed lectures for his students on Fundamental legal Sciences, Czech Commercial and Civil Law, Bills, Notes, and Checks. Among his larger printed works may be mentioned the Textbook on Bills and Notes for the Commercial Academy (Prague, 1913), Corporation Law (Prague 1917), Compadium of Czechoslovakian Commercial Law and the Most Important Differences between Slovakian and Czech Law (Prague, 1921), New Law of Bills and Notes and Changes in Our Former Law of Bills and Notes (Prague 1928). Reform of Our Currency (Prague 1932). The American Department of Commerce included his publication Trading under the Laws of Czechoslovakia in its Trade Information Bulletin No 444 (Washington, Government Printing Office. 1926)

He is also president of the legal department of the Union for Insurance Sciences and 16 years vice-president of the Czechoslovakian branch of the International Law Association.

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TRANSLATION FROM TURKISH MILITARY MEDICAL REVIEW

The Fight Against Tuberculosis and Our Army's Role in This Endeavor

The tuberculosis death rate is very high. The fight against tuberculosis requires a plan of the united efforts of official civil, military, and private institutions. This article points out the principles and the steps in which the Army can take in the execution of this plan.

The American Health Commission during its fight against TB supported the following four principles in the 1944 conference: 1) Diagnosis, 2) Treatment. 3) Rehabilitation. 4) Social welfare.

1) Diagnosis. The X-Ray, the most modern means of diagnosis. In recent years, the use of 35 x 70 mm films and mobile units has facilitated the inexpensive examination of large numbers of people. This method has become a definite necessity for our army. All officers and enlisted men must be examined before their acceptance into the army. In this way, men with TB will be isolated and the soldiers will be protected from infection. It also facilitates the treatment of those in the primary stages of infection.

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Examination of 25 million persons in the U.S. since 1942 has shown that 1 to 2 persons out of every 100 may have had TB. This is the accepted minimum ratio although we have not yet begun such examinations and have no information about such ratios. According to their statistics, 70% were light cases, 25% were medium cases, and 5% were serious cases. Comparing these figures with the number of people being treated in hospitals (10% light cases, 30% medium cases, and 60% serious cases), the advantages of this X-Ray examination system are obvious. This examination also reveals chest diseases other than tuberculosis. Out of 442,252 individuals examined by Gould, 4992 were found to be afflicted with some other chest organ disease. Many of those examined were not aware of their conditions.

In short, our Army must buy this equipment and conduct examinations in our country. It will be an advantage in all respects.

2) Treatment. The place for treatment is an important matter among TB cases which are discovered at the time of army induction. There must be a definite change of climate and patients must not be allowed to return to their home environment. Even if treatment in civilian hospitals were assured these young people, there would not be enough beds for patients. But if treatment were given in military hospitals it would be a general asset for our country in the fight against tuberculosis, and a real benefit to our army by protecting army-personnel from infection.

In normal times, all those who are accepted in the army after an X-Ray examination are considered basically free from tuberculosis. These men are separated from suspect cases. Suppose 200,000 men enter the army during peacetime, and one man out of every 100 is infected with TB; it will then be necessary to set up 2000 beds for the treatment of these men. It will mean that 2000 infected young men will benefit by tuberculosis treatment, and 198,000 men will be protected from infection. Within a year, most of the beds will be vacant. TB treatments will last from 6 months to 2 years depending on the case. According to the above, 70% are minor cases (that is, 1400 individuals), which means that their treatments will be completed in six months and that 1400 beds will be vacant. Treatment for the 25% medium cases (500 men) will be completed within one year. If we suppose that a part of the remaining one hundred serious cases (let us say about 30 or 40 men) die, the other 50 or 60 cases will be carried over to the following year. In other words, a year later most of the 2000 beds will have been vacated, and new cases can be accepted. It is obvious by these figures that the treatments given every year to the youth of the nation is a great advantage to the army. It is hoped that our army may assume this outstanding responsibility as soon as possible.

It is also necessary to protect soldiers in active duty. This is done by the same methods used against other contagious diseases. Defense against TB however, is a different problem. TB destroys a weak and undernourished individual.

It is necessary, therefore, to increase nourishment. Our soldiers receive proper amount of calories in their food. This was true even during critical periods. Animal albumins were the only substance lacking from among all the sources of nourishment. A lack of this substance retarded progress in, and decreased resistance against, TB, pleurisy, and other infections. A laborer who weighs 132 lbs requires 60 grams of proteins daily. This amount can be equaled to 300 grams of meat. This amount was not maintained during the economic crisis of the last few years. The resulting increase of TB and pleurisy cases in our army during the last few years has made this a deficiency of prime importance. When we consider that these young men come from villages where very little/or no meat is eaten, when we have supplanted this deficiency, progress will have been made. Protein is found in fish, meat, and eggs. Two eggs are equal to more than 100 grams of meat. I am sure that great progress will result if attention were paid this fact in the army.

Besides these nutritive benefits from eating meat, a soldier's strength and his willingness to fight are increased. The Turks have always been known for their superior fighting ability among the Asiatic nations. Horse meat and mare's milk then constituted a large part of their food. Training our soldiers to eat meat will increase the fighting strength of our army and the nation. It is necessary to do this by any means possible.

Rehabilitation.... This and the next subject relate not only to the army but also to civilian welfare. Our army has aptly participated in this matter. It is not right that those who have recovered from TB treatment and are considered cured should be unemployed. By systematically aiding these people to find employment, we save them from poverty and also increase the potential of our nation. The important consideration is that it will benefit the industrial progress of our nation.

Normally a person who has been treated for tuberculosis can work only four hours a day. These persons can work during vacations and holidays of the reguler workers. It can also be beneficial to give these people industrial training while they are in the sanatoriums as well as over a period of time after they have left the sanatoriums. Army duties being rather heavy recovered patients must depend upon social welfare. The army can employ those who were treated for TB at the time of their induction. For example, attendants and other workers in the army sanatoriums may be selected from among these people.

They can be given light work in war factories. Yet positions available in the army to these men are limited. After TB patients have been treated in army hospitals, the problem of finding employment for these people should be taken care of by the social organizations.

The benefits that disabled soldiers receive may be given to these people. The fact remains that these cured patients should not be allowed to shift for themselves, lest all the trouble and expense of examining and treating these patients be wasted.

4) Social welfare... This is also an important and immediate social problem. For example, those who contract TB while in military service should be given unemployment compensation or the equivalent in food benefits. In this present age, no civilian among ex-patients should be neglected or left unemployed. Money allocated from the military budget for this humane purpose can never be considered too much. Our army's part in this civil duty is going to be an example to all the other organizations in our country.

In short, by participating in this fight against tuberculosis, the army not only benefits itself, but also gives a great service to our country's social welfare organizations. Close cooperation must be maintained with them.

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Translation from the Turkish Military Medical Review

OTITIC AND SINUS BAROTRAUMA

Earaches are the first pathological signs during flights. Air pressure decreases as the altitude increases. At 5,000 meters it is equal to 760 milimeters water pressure. It is necessary that the air found inside the body have the same specific gravity as the external air. Otherwise, it can cause many serious air accidents.

Body gases are divided into two groups: a) dissolved gases; b) retained gases.

1) The dissolved gases are found in the blood and body tissues such as nitrogen and oxygen.

2) Retained gases:

A) In the eardrum cavity.

B) In the sinus.

C) Intestinal gases.

During an ascent, retained gases must be equal at all times to the specific gravity of the air.

Decrease in pressure causes the tissue gases to flow freely in the blood, thus causing discomfort and instability pains to the pilot.

Medical science has made considerable progress in research on these changes caused by dissolved and retained gases, and research is being continued to find remedies for the changes.

In natural physiological conditions, if a small amount of air is taken out from the eardrum during the climb, then pressure equality will be retained. The physiological condition during decreasing altitude is just the opposite. In other words, air enters from the outside into the ear. The same mechanism exists in the sinus.

Previously, airmen were always tried in test planes for their physical capabilities, but that has been a very costly method. Therefore a more suitable means has been invented -- the low pressure chamber. The French and the Germans first came out with a mobile unit. Later on, stationary establishments were set up. The Americans have made certain progress towards this objective. With several types of chambers set up in their air-examination centers. These chambers have exceedingly decreased the problems in air medical science.

By means of the experiments made in these low pressure chambers, the following two subjects have been carefully examined:

1) Ear and sinus variations caused by instant changes in atmospheric pressure.

2) Limits of ear inflammation in individuals.

During 1943, a group of 2162 individuals made 7000 flights at an altitude of 25,000 - 35,000 feet. These tests were made during the months of February and March because angina is prevalent during these months. Casualties were divided into two groups:

1) Those complaining of earaches.

2) Those complaining of difficulties due to the pressure once or several times during descent. According to the degree of pressure equalization, a) minor, b) moderate, c) and severe results were divided into two sections; those who were affected during their flight in the upper stroto-sphere, and those who were unaffected.

The following is a summary of test results:

1) Of the Barotrauma cases 13.3% occurred during the descent from an altitude of 25,000 feet. The orifice of the pharynx adjuoining the Eustacian tube acts as a valve and allows the air to go out freely but does not permit air intake. The above figures concerning air personnel are rather high. These figures are the results of the first 25,000-foot climb. At a higher altitude of 35,000 feet, the results were 11.1%, 7.0%, and 5.9%.

2) Sinus Barotrauma cases were 3% at 25,000 feet, and 1.5% and 0.6% at 35,000 feet.

3) Otitic and sinus cases have been high in those affected by air sickness. Among those who were not affected at 25,000 feet, otit and sinus cases were 12.2%, and those who were effected, 20.4%. During the third trial at 35,000 feet, the results were 2.4% and 10.1%.

4) Many pilots experienced minor difficulties during air equalization. Moderate and severe difficulties at 25,000 feet were 3% for those who were not affected by airsickness, and 4.1% for those who were affected.

5) The number of otitic and sinus barotrauma cases decreased gradually from the first 25,000 foot-training test to the third 35,000-foot test. This shows the importance of this training. Only two individuals of the 2182 who were used for these tests were treated in a hospital, and they soon recovered without any pathological change.

6) Of the test pilots who descended from a 25,000 foot altitude 83 % experienced no difficulties, and 96 % experienced only minor ear drum effects during pressure equalization.

7) All air personnel should have a knowledge of the "Valsava maneuver" for ear ventilation. When air personnel experience difficulty in the stratosphere, they should not hesitate to force air into the eardrums.

8) Air personnel are taught the principles of pressure

equalization by practice in the low-pressure chambers.

9) Otitic Barotrauma is due generally to the lack of knowledge of equalization principles.

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BIOLOGY OF AIR MEDICINE AND PRINCIPLES

The human body does not have storage places for air as it has for food and nourishment. It needs air all the time. The composition of air is as follows:

Nitrogen	78.00
Oxygen	20.96
Carbon Dioxide	0.04

This mixture is admitted into the body in repeated quantities. The atmosphere up to an altitude of 10,000 meters is called the Troposphere, above which is the Stratosphere. The substratosphere includes the altitude between and 6000 and 10,000 meters. Air decreases in density at higher altitudes, but the gaseous ratio remains constant.

The total of the compounding gases produce the barometric pressure of air, each gas maintaining its individual partial pressure.

The temperature, the current, and the humidity of air vary according to altitude. Barometric pressure decreases with altitude:

Altitude	Barometric Pressure
Sea Level	760 mm mercury reading
2,500 m	3/4 Atm.
5,500 m	1/2 "
8,500 m	1/3 "
10,500 m	1/4 "
12,500 m	1/5 "
13,500 m	1/6 " (See Diagram 1)

As general barometric pressure decreases, the partial tensions of the air's compounding gases also decrease.

Temperature also has identical variations. Vaporized air drops 0.5 degrees every 100 meters, and dry air drops 1.0 degree every 100 meters. The temperature above the troposphere falls as low as -56 C. This temperature remains uniform within the stratosphere, a region of unknown height:

Altitude	Temperature Centigrade
Sea Level	+ 15
2,000 - 3,000 m	+ 0
5,000 m	-10 - 15
6,000 m	-15 - 25
10,000 - 14,000 m	- 56

Airplanes reached a height of 450 meters in 1902. In 1913 an altitude of 10,000 meters was attained and and 13,000 meters in 1930. Recently, Pezzi, an Italian reached an altitude of 17,000 meters. The heavens have been conquered and man has gone beyond the physiological limits of the human body. There is a deep lag between technical progress and the knowledge of human biology.

This is because the human organism cannot withstand temperatures of -56.0 degrees at an altitude of 17,000 meters.

The primary effects on the human body during an increase in altitude are the decreases in barometric pressure and O_2 partial tension.

The human organism must first try to adjust itself to two factors.

In normal conditions, the organism does not require an O_2 reserve. Oxygen is distributed to the arbor alveol by breathing. Since the O_2 pressure is higher than the blood pressure, a direct osmosis takes place from the arbor alveol. Plasmolysis also takes place. The plasmolytic process depends upon the pressure of the O_2 in the arbor alveoli. When the plasma dissolves it mixes with the Hb

$$HB\ 4\ \ 4\ \ O_2 \leftrightarrows Hb\ 4\ O_8$$

This mixture is dependent upon the average temperature required in dissolution, salt concentration, and pH. The O_2 saturation index of H_b generally runs along this curve: (Diagram 2)

In the arterial circulation, the blood retains its O_2 content until it reaches the capillaries, then passes into the tissues. Oxygen pressure in the tissues is low. It is liberated from the Hb and then passed into the tissues. High temperature aids in the separation of acid metabolic matter particularly carbon dioxide. The tissues absorb from 1/4 to 1/5 of the oxygen. Finally the blood returns to the lungs through the pulmonary artery, and oxygenation is again repeated.

The degree of O_2 consumption in the tissues changes according to the kind of tissues, their functions, and the speed of the circulation. We observe the following by closely examining the curve of the O_2 saturation of Hb:

The O_2 content of Hb is conservatively spent. This continues until the O_2 partial tension is reduced to an equal basis. Up to this point, O_2 saturation decreases rapidly. But during this consumption, the O_2 must have a minimum partial tension. The increase of acid metabolic matter (particularly CO_2), facilitates the separation of O_2 from Hb. On the other hand, O_2 partial tension remains at its maximum degree and becomes stable. Diagram (3).

Oxygen deficiency does not affect the body up to an altitude of 3000 meters. The following phenomena take place:

1) Oxygen deficiency affects the chemoreceptors in the carotid gland which is situated in the carotid sinus. This deficiency accelerates breathing and at the same time affects the tonicity of the reflex muscles and also increases the air volume in the lungs (Verzar). In this way, the volume in instantaneous breathing is increased. The rate of respiration is increased but its depth is decreased and becomes limited. Only an increased meteorism decreases the vital capacity.

2) Circulation is accelerated and the pulsation is increased. In this way, the O_2 tension decrease and the deficiency in O_2 saturation are equalized. The volume increase in the heart becomes a burden. At an altitude of 8200 meters, the heart expands.

Vasomotor tonicity does not remain idle. It improves circulation in the lungs by causing vasoconstriction in the abdominal organs and in the lower extremities of the body, and causing vasodilation in the lungs.

The following are the resulting changes in the blood:

a) First the spleen contracts and causes congestion. This increases the immediate values of bilirubin and hemoglobin. The transmission of O_2 is increased. Animals from which spleens have been removed cannot adapt themselves to high altitudes and hemolysis takes place in about 2-3 weeks.

Iron deficiency becomes evident. This condition causes hyperregeneration (involving the bones). Metabolism in the cells and the enzymes in the blood which ensure breathing are increased. (Vanotti - Verzar)

b) The facile increase and separation of O_2 in the tissues is assured by an increase in the blood supply.

c) An increase of acid metabolic matter assures the facile separation of O_2 (in the tissues) from Hb. Muscular activity produces surplus lactic acid. This occurrence assures the possibility of enduring surplus separation of O_2 from Hb due to O_2 deficiency in the body. With these last two occurrences, the O_2 in the blood is assimilated much better. The difference between the O_2 in the blood and the arbor alveoli become very small. Under favorable flight conditions and time factor this difference does not occur very often. The O_2 deficiency is equalized only by the dynamic factors: (Schubert).

a) Accelerated pulsation

b) Accelerated respiration

c) Congestion of blood.

Even if the circulatory function is normal the accelerated breathing brings about a great danger. Hyperventilation equalizes the decrease of O_2 tension in the arbor alveoli, but decreases the CO_2 tension. Similar CO_2 conditions occur in the blood. The Ph of the blood increases and changes into alkalinity. There are various results due to these conditions.

The effects of CO_2 are similar to hormones. It stimulates and regulates the respiratory center. The body strives to avoid being deprived of this important substance. The alkalinity of the blood caused by hyperventilation now decreases. Hypocapnia is a decrease of CO_2 tension in the blood and is brought about by hyperventilation. This condition is due to decrease in O_2. The kidneys equalize this condition by eliminating alkaline. If this compensation is ineffective calcification, cramps and "blackouts" occur. Metabolism does not progress during altitude increase because of the deficiency in the arbor alveoli and anoxic anoxia resulting from acapnia. Internal combustion is retarded. Incomplete consumption of acid metabolic substances occurs. These substances burden the alkali reserve and allow CO_2 to escape. Besides this due to a change in the metabolism the endogenous CO_2 source decreases. Hyperventilation causes the change of biochemic hypocapnia to hypocapnia. Carbon dioxide deficiency in metabolism is called Metabolic Hypocapnia. This phenomenon neutralizes alkalosis by acquiring the reserve alkaline. The acquisition of the reserve alkaline is called capacity hypocapnia. This condition does not exist at higher altitudes. The decrease of water vapour and the temperature in the atmosphere cause an increase in the CO_2 in the arbor alveoli. This also causes more CO_2 to escape from the arbor alveoli. This is called Mechanical Hypocapnia and the respiratory center is deprived of its normal stimulants.

Asphyxia due to O_2 deficiency at high altitudes is different from suffocation. In asphyxia, the CO_2 content in the blood is very low and during this period of danger the pilot loses consciousness. Anoxia also causes the existence of unconsumed metabolic substances. The Cheyne-Stokes respiration theory is based on the fact that the respiratory center is deprived of normal stimulation and subjected to the effects of metabolic acids. Acidosis begins. Dyspnea, depression, and torpor appear. There is a decline in the tonicity of the vasoconstriction. Blood pressure drops. Later it changes to an opposite condition.Pressure returns to normal. Upon the termination of this limit of change, tension increases. Finally, there is a failure in the circulation. Vagus sensitivity decreases . Pulsation increases. At an altitude of 5000 meters, metabolism increases (during reposal ?) The increase is at a 15-20 % ratio. This condition acts as a regulator against the danger of alkalosis (Kuhl-Kuhn).because metabolism drops to normallcy by giving CO_2. Severe irrigularities appear by dropping to a lower level. The subsequent result, like narcosis, is a paralyzation of the respiratory center.

At high altitudes, a pilot not only encounters O_2 deficiency but also hypocapnia, due to the need for both CO_2 and O_2 . An irregulatity in the CO_2 content can forewarn hypoxemia and avoid this condition. But the amount of CO_2 is not always stable and pilots climbing to high altitudes at a rapid speed come face to face with dangers of decompression and aero-embolism.

This phenomenon is entirely different from what we know as Caisson disease and could be erroneously diagnosed as such if not careful. In this particular case suppression is in excess of normal atmospheric pressure. Nitrogen dissolves excessively above normal in the blood and tissues. Until free from suppression, forceful dissolution of N_2 develops emboli. According to the specific organs and centers, various syndromes and results arise. Here, however, and particularly at high altitudes, the barometric pressure is low and there is also an obvious increase in CO_2, and the human plasma turns watery and the blood as a whole becomes turbid .

When a pilot climbs or dives at a fast rate of speed, and then tries to come out of the dive, he is subjected to the effects of extremely violent forces. In a plane that is traveling at a rate of 350 kilometers per hour, and turning and banking in a circle of 175 meters in diameter, the pilot is subjected to the effects of a force six times greater than the rate of speed. In other words the pilot is held to the spot where he is sitting by a force six times greater than the rate of speed. Traveling at a rate of 575 kph and banking in a 200 meter diameter circle, a pilot is subjected to a force twelve times greater. A normal human body can withstand the pressure in a 500 meter diameter circle. A pilot who is sitting in an upright position is directly affected from head to foot by the force resulting from changes in speed and banking.

We all know that the heart distributes O_2 to the entire body, the brain being most sensitive to O_2.

The distance of 42 cm between the brain and the heart of a medium-height person in a sitting position is proportionate to 30 mm registered on a mercury column. This mercury reading must be lowered for the heart to send blood up to the brain. In a flight in which the centrifugal force has been increased six times, the blood volume equivalent to this 30 mm reading on the mercury column is:

30 X 6 = 18- mm

A rise from 150 mm to 180 mm in the mercury reading does not produce a decrease in the volume of blood between the heart and the brain and as a result of this hydrostatic condition, the heart is unable to send blood to the brain. The blood therefore collects in the lower region of the brain and vicinity and causes congestion. This condition causes various syndromes, unconsciousness and visual defects. Arterial tension is increased and causes vasoconstriction in the lower parts of the body. Speed changes in 10-20 seconds will produce these syndromes. A person can withstand a centrifugal force increase 5 times greater than the normal force. The limit attained was an increase of ten times as great. Inside and outside loops cause more serious effects. The body can endure this force only three times that of a normal pressure. It may cause hemorrhages in the brain and retina.

The blood in the veins flows slower and during outside loops the pressure on the heart becomes greater.

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Besides these, a pilot must endure the various vibrations of the propeller, wings, motors, air current, low temperature, and is also subjected to the possible repercussion of recompression due to rapid descent.

According to Strughold, a pilot is physically normal when climbing up to an altitude of 2000 meters. In this zone. In this zone, called the zone of indifference, there are no signs of O_2 deficiency, the reflexes are normal and the body activity does not require any precautions. See diagram 4.

Beyond 2000 meters, respiration and circulation show hemophilic signs. Hyperventilation begins at 2000 meters, and tachycardia begins at 2000-3000 meters. At 2500 meters, the reflexes become particularly weak and hypoventilation begins. At 3000 meters hypocapnia results and the spleen indicates calcification. The muscles become lax

The point of reaction to O_2 deficiency, at an altitude of 2000 meters, is called Reaction Onset. The zone between 2000-2500 to 4000-5000 meters is called the Zone of Complete Dissimulation in which the body begins to oppose O_2 deficiency.

The body cannot withstand further O_2 deficiency. Irregularities begin. This point of irregularity at 4000-5000 meters is called the Irregularity Onset. At these altitudes, a pilot is able to continue his activities in accordance with his physical condition. The international normal atmosphere is in this altitude zone of 0-5000 meters. The barometric pressure in this zone is 1/2 atmosphere. A pilot is not subjected to danger in this zone. These zones are also life savers and a pilot in need of O_2 can dive down to these zones with available speed if necessary.

A parachutist tries to find these zones with all possible speed. This zone is called the Zone of Dissimilation.

The human body cannot withstand O_2 deficiency at altitudes higher than 4000-5000 meters. Suffocation begins. The reflexes become adversely violent in this zone. The (limits) are higher. Regularity and coordination of the body exist but O_2 deficiency is evident. Latent condition becomes evident. The body cannot assure dissimilation. The zone up to 6000 meters is called the Zone of Incomplete Dissimilation. Mental irregularities begin in this zone. The pilot's stamina decreases. At 6000 meters musculer coordination disappears. The reflexes become unstable. The onset of this condition is called the critical onset. Altidudes higher than this critical onset point produce identical conditions. Remaining in this zone for a long period of time produces similar condition as that produced by O_2 deficiency. This zone, 6000-8000-10000 meters, is the substratosphere , and is called the Critical Zone. The reflexes transform to convulsions. Later on the Onset of Fatality and the Zone of Fatality begin. From the Critical Onset Point, the transformation from one symptom to another is very rapid and subsequent death is only a question of time.

The human body does not require very much O_2 in the zones of Indifference and Complete Dissimilation. However, from the line of Irregularity Onset, that is, from an altitude of 4000-5000 meters and beyond auxiliary O_2 is required. Accidents are avoided by such measures. Advantages of auxiliary O_2 become very evident even in the Critical Zone and convulsions can be avoided. The time factor, however, is very short, for this precautionary measure. Advanced conditions are irreparable for convulsions turn into paralysis.

 RESTRICTED

In the substratosphere above 6000 meters, CO_2 deficiency and hypocapnia become more evident. Confusion caused by a decrease in the barometric pressure becomes evident. Temperature decrease also becomes a vital factor. Even if precautions against all these conditions are taken the limit of endurance develops quickly after 10,000 meters. The limit of flying is 11,000 meters with additional supply of O_2.

By taking all precautions, a pilot may be able to go higher than an altitude of 6000 meters, but there he is subjected to mishaps. He may be deprived of O_2. Compression chambers and garments prove invaluab le at this altitude. With these precautionary measures, all these zones mentioned above may be conquered. That is, the zones of Indifference, Complete Dissimilation, Incomplete Dissimilation, Critical (or Convulsive), and Fatality.

The time required in traversing these zones is very valuable. It is the time used up to the point of irregularity onset after the O_2 supply is severed. It is the time of tolerance for the pilot. It is called the Time Reserve. At this stage the pilot must control himself, endure alll possible abnormal conditions and dive down to lower altitude for O_2. If he is not equipped with O_2 apparatus, or cannot dive quickly to the physiological atmospheric zone he must parachute down to the "life-saving" elevations. The time of tolerance is dependent upon:

a) The degree of elevation (intolerance is shown sometimes at higher and lower altitudes than these zones)

b) individual physical fitness

c) individual physical and psychological condition at the specific moment.

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The average time reserve is five minutes at 5000 meters, 1.5 minutes at 6000 meters, and 40 seconds at 7000 meters.

It is necessary that the time reserve for each pilot must be determined beforehand by means of pressure chambers and training. It is safe to say that the average time reserve for a person is a few minutes at 8000-9000 meters altitude. This is more properly expressed in seconds. If one attempts to go beyond this zone the time factor is decreased to half. If the pilot showed any indication of susceptibility to these conditions he must hasten to the top layer of the physiological atmosphere during the remainder of this period of time. This holds true in the case of a parachutist dropping from altitudes above 5000 meters.

It is known that a falling body (for example, a jumper whose parachute has not yet opened)attains a speed of 55 meters per second in 300 meters. This means that a descent of 1000 meters is covered in 18 seconds. After the chute finally opens the rate is 5maters per second. At this rate it requires 3 minutes 20 seconds to drop 1000 meters. Rates of Parachute drops are:

From 9000	to	8000	meters	3	minutes	20	seconds
"	"	" 7000	"	6	"	40	"
"	"	" 6000	"	10	"	---------	
"	"	" 5000	"	17	"	---------	

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"	"	"	7000	"	6	"	40	"
"	"	"	6000	"	10	"	---------	
"	"	"	5000	"	17	"	----------	

According to the Time Reserve, these figures are quite high. A high time reserve, high endurance , and O_2 apparatus are essential in making a jump from high altitudes.

Flight accidents due to abnormal condition of the human organism and caused by atmospheric and mechanical technicality are as follows:

1) Physical abnormalities observed during ascent:

Steep climbs cause tachycardia and arrhythmia. A rapid climb causes these conditions to appear even at low altitudes.

Palpitation becomes evident and the face reddens. Hemorrhages occur in the mucosas (nose, ear). Thirst, hunger, nausea, and at times vomiting also occur. Distention of the abdominal region with gas causes difficult breathing and abdominal pains. Tinnitus and otodynia develop. These symptoms are all due to the lack of O_2. As the O_2 deficiency becomes more acute, hyperventilation and dyspnea develop. Dullness of mind and will power, headaches, asthenia, unconsciousness, irresponsibility, doubtfulness, and difficulty in comprehension appear. Locomotion becomes difficult and coordination irregular. The pilot seems intoxicated. Sometimes this condition of intoxication takes place suddenly and the pilot loses the chance to wear a mask. The pilot is then immediately subjected to syncope. If the airplane drops to the physiological zone, the pilot recovers and these syndromes are relieved.

Maximum tension decreases for a while and then rises. The tension decrease is very little when travelling on a horizontal plane. This condition continues during descent and for a while even after descent. During a climb the minimum tension begins to decrease. And this decrease continues for a while even after descent.

Internal secretions generally decrease and the urine output also decreases. Azotemia increase becomes evident.

The urine of the pilots becomes free of urea after the end of the flight. During the time of flight hyperglycemia takes place.

2) Aviators' disease (A. Ruhl): The causes of aviators' disease are hypoxemia and hypocapnia. The time factor is very important relative to the appearance of this disease. Air disease is a type of suffocation, but in this case suffocation is not attained and only a CO_2 deficiency occurs. The onset of this disease is slow. This condition constitutes an extraordinarily grave danger. Breathing becomes cyclic and changes to Cheyne-Stokes respiration. Vasomotor changes appear. These general symptoms lead to the appearance of various clinical symptoms which vary according to the individual. They appear after the limit of dissimilation. Light cases progress in stages as far as the fatality zone. The most serious cases are as follows:

a) Early Crisis: The early crisis shows sudden serious symptoms. This condition frequently appears even at an altitude of 6000 meters which is not considered dangerous.

The most obvious condition is the Early Collapse. The pilot may not show any of these symptoms and yet suffer dizziness. He may then collapse suddenly. Systolic and diastolic pressure decrease (Vasomotor paralysis) then Blackout takes place. The face and hands become cold and the pulse rate increases. All these symptoms together with vagotonic symptom and vomiting occur during the Pulsation Crisis. Pulsation decreases and vagal bradycardia occur.

- Continued in the next issue.

Imports into the Eastern Zone via the Port of Wismar for the Period from 1-27 Aug 1948

Date	Train No	Axles	Load in Tons	Commodity	Destination
4.8.	19168/702	82 G 41	1005	Grain	Berlin
9.8.	19033	82 G 41	1027	Grain	Leipzig
	19037/903	82 G 41	1033	Grain	Berlin
	19030/502	82 G 41	886	Grain	Berlin
	19036	74 G 25 0 12	796	25 cars of Grain and 12 cars of Potatoes	Berlin
10.8.	19044/504	82 G 41	1015	Grain	Berlin
	19055/Sw 5	82 G 41	1075	Grain	Berlin
14.8.	19110/Sch 7	82 G 41	998	Grain	Leipzig
	19093/38	82 G 41	1016	Grain	Freital
	19111/Erf 8	86 G 43	1030	Grain	Velton/ Teltow
	19116/Erf 9	82 G 41	982	Grain	Cottbus
15.8.	19122/Sw 8	82 G 41	1003	Grain	Leipzig
	19124/Erf 5	80 G 40	1017	Grain	Wueston
	19119/Sch 9	82 G 41	998	Grain	Teltow
19.8.	19170/Erf 6	82 G 41	1050	Grain	Cottbus
21.8.	19177/1000	82 G 41	1130	Grain	Leipzig
22.8.	19002/Sch 4	82 G 41	1134	Grain	Brandenburg
23.8.	19011/1013	84 G 42	1032	Grain	Leipzig
	19070/Sch2	82 G 41	1060	Grain	Leipzig
24.8.	19036/1005	82 G 41	1075	Grain	Cottbus

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25.8.	19057/31	90 G 45	1010	Grain	Dresden
	19050/Sch 8	84 G 42	1040	Grain	Cottbus
	19053/H 1	82 G 41	760	Grain	Cottbus

SUPPLEMENT

8.8.	19017/Sw 4	70 G 35	752	Oats	Leipzig
	19024/Sw 1	82 G 41	1028	Grain	Berlin
11.8.	19071/505	82 G 41	1039	Grain	Leipzig
12.8.	19016/37	82 G 41	1006	Grain	Leipzig
	19078/Sch 6	91 G 46 [sic]	1152	Grain	Leipzig
[illegible]	19075/H 21	82 G 41	1093	Grain	Magdeburg
	19081/~~H~~ B 10	80 G 40	980	Grain	Berlin
16.8.	19138/B 7	82 G 41	1013	Grain	Cottbus
17.8.	19145/504	82 G 41	1044	Grain	Leipzig
	19150/Sch 10	82 G 41	1026	Grain	Teltow
20.8.	1008/19276	84 G 42	1031	Grain	Brandenburg

G - closed cars

O - open cars

Pl - flatcars

K - ~~refrigerator~~ tank cars

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Exports from the Eastern Zone via the Port of Wismar for the period from 1-27 August 1948.

Date	Train No	Axles	Load in Tons	Commodity	Point of Origin
1.8.	110/1333	118 G 48 9 9	1217	reparations	Magdeburg
	12/50191	90 G 45	1148	cement	Nienburg
	19303 [illegible]	80 G 1 0 39	1003	Glauber salt	Salzungen
	120/19215	78 G 39	967	potash	Sollstedt
	W 122	78 G 3 0 36	1084	potash	Bischofsroda
2.8.	Wi 2	76 G 36	982	potash	Sollstedt
	913/1201	90 G 45	1165	cement	Nienburg
	19110	82 G 40 K 1	611	reparations	Magdeburg
3.8.	Wi 123	70 G 6 0 29	988	potash	Bischofsroda
	110/1331	124 G 54 0 7	1204	reparations	Magdeburg
	110/1709	98 G 49	1256	cement	Karsdorf
	Wi 101	68 G 34	955	potash	Bischofsroda
	19223	88 G 44	1100	cement	Nienburg
4.8.	19317	90 G 45	1149	cement	Nienburg
	Wi 102	94 G 10 0 36	1214	potash	Bischofsroda
5.8.	W 105	70 O 35	998	potash	Bischofsroda
6.8.	Wi 105	68 G 5 0 29	925	potash	Bischofsroda
	Wi 104	78 G 39	888	potash	Sollstedt
	Wi 106	76 G 38	954	potash	Unterbreitsbach
	19321	90 G 45	1130	cement	Nienburg

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Date	Train No	Axles	Load in Tons	Commodity	Point of Origin
7.8.	120/55155	102 G 51	1266	Sugar	Halle
	19841	~~[illegible]~~ 94[illegible] G6 0 36	1240	potash	Salzungen
	110/1710	72 G 36	911	~~[illegible]~~ cement	Karsdorf
	Wi 108	70 0 35	973	potash	Menterode
	Wi 109	60 0 29	915	potash	Bischofsroda
	Wi 111	78 0 39	955	potash	Bleicherode
8.8.	Wi 3	76 G 2 0 37 [sic]	1025	potash	Limbach
	Wi 6	78 G 1 0 38	1052	potash	Salzungen
	Wi 110	68 G 25 0 9	904	potash	Sollstedt
~~[illegible]~~	Wi 5	76 G 6 0 29	1034	potash	Unterbreitsbach
9.8.	Wi 113	70 0 35	950	potash	Bleicherode
	Wi 112	86 G 2 0 41	1128	potash	Bleicherode
	Wi 9	82 G 8 0 32	1115	potash	Dorndorf
	Wi 10	68 0 34	919	potash	Unterbreitsbach
	120/50604	~~90~~ (45) ~~G [illegible]~~	1135	cement	Nienburg
	110/1911	78 0 39	987	cement	KARSdorf
	110/1391	116 G 54 62	~~[illegible]~~ 1044	reparations	Magdeburg
10.8.	Wi 116	76 G 3 0 34	1148	potash	Bleicherode
	Wi 11	82 G 2 0 38	1094	potash	Salzungen
	W 4	78 0 39	1052	potash	Salzungen
	Wi 114	80 Pl 2 0 37	1013	potash	Bleicherode

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Date	Train No	Axles	Load in Tons	Commodity	Point of Origin
	Wi 115	76 G 7 0 31	1059	potash	Sollstedt
	Wi 12	78 G 23 0 14	99~~9~~0	potash	Unterbreitsbach
	Wi 8	80 G 3 0 37	1134	potash	Dorndorf
	Wi 14	78 G 38	1044	potash	Dorndorf
~~[illegible]~~	Wi 13	86 G 2 Pl 2 0 3~~2~~9	1096	potash	Dorndorf
11.8	Wi 16	74 0 36 G 1	1038	potash	Salzungen
12.8	19235	70 0 35	953	potash	Dorndorf
	Wi 120	70 0 35	967	potash	Bleicherodde [sic]
	Wi 17	82 G 12 Pl 1 0 28	1040	potash	Bleicherode
13.8	Wi 118	66 G 33	825	potash	Sollstedt
14.8	Wi 15	84 0 40	1115	potash	Dorndorf
	Wi 19	76 0 38	1167	potash	Dorndorf
	Wi 119	76 0 38	1085	potash	Bischofsroda
	Wi 18	78 G 2 0 37	1046	potash	Limbach
15.8	Wi 117	88 G 2 0 42	925	potash	Bleicherode
16.8	Wi 22	78 G 1 0 38	1078	potash	Salzungen
	Wi 21	86 0 40	1193	potash	Salzungen
	Wi 23	76 0 38	1000	potash	Unterbreitsbach
17.8	Wi 24	76 0 38	1027	potash	Salzungen
	Wi 122	70 G 6 0 29	1010	potash	Sollstedt

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Date	Train No	Axles	Load in Tons	Commodity	Point of Origin
18.8	110/1344	90 G 45	1073	reparations	Magdeburg
	Wi 124	74 G 1 0 35	925	potash	Bischofsroda
19.8	Wi 25	76 G 37	1011	potash	Salzungen
	120/50618	82 G 38 (G 3)	1102	sugar	Genthin
	Wi 26	84 G 2 0 39	1143	potash	Salzungen
	Wi 27	76 0 38	1063	potash	Salzungen
	Wi 218	72 6 0 38	1003	potash	Bleicherode
20.8	Wi 38	76 0 38	1048	potash	Unterbreitsbach
	120/50621	82 G 36 (G 5)	1176	sugar	Genthin
	Wi 125	68 G 1 0 33	952	potash	Sollstedt
	Wi 29	82 G 2 0 38	1100	potash	Salzungen
	Wi121	70 G 35	1002	potash	Sollstedt
	110/7733	100 G 39	1226	cement	Karsdorf
	Wi 30	84 G 4 [illegible] 0 39 [sic]	1054	potash	Salzungen
21.8	Wi 217	60 0 30	894	potash	Neuterode
[redacted]	Wi 123	70 0 35	935	potash	Bleicherode
	Wi 31	70 0 35	991	potash	Unterbreitsbach
	Wi 33	76 0 38	1149	potash	Salzungen
	Wi 127	76 0 38	998	potash	Sollstedt
22.8	Wi 36	80 G 2 0 38	1074	potash	Limbach

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	Wi 219	78 0 38	1055 ~~[illegible]~~	Potash	MeuTerode ~~[illegible]~~
	Wi 228	68 G 47 0 30	963	potash	Meuterode
	Wi 34	72 0 35	989	potash	Unterbreitsbach
23.8.	Wi 221	60 0 30	797	potash	Meuterode
	Wi 129	70 0 35	1008	potash	Bischofsroda
	110/1939	94 G 31 0 15	905	potash	Nienburg
	Wi 128	66 G 28 0 5	815	potash	Salzungen
	Wi 222	60 0 30	896	potash	Meuterode
	Wi 130	70 0 35	1012	potash	Bischofsroda
	Wi 93	60 0 30	845	potash	Meuterode
24.8	Wi 224	78 G 1 0 38	1034	potash	Meuterode
25.8	Wi 132	68 0 34	1002	potash	Bischofsroda
	Wi 225	80 G 9 0 31	1071	potash	Bischofsroda
	Wi 133	66 0 33	935	potash	Bischofsroda
	Wi 38	82 G 1 0 38	1111	potash	Limbach
26.8	Wi 38	80 G 2 0 38	1063	potash	Salzungen
	Wi 226	84 0 41	1108	potash	Meuterode
27.8	Wi 41	80 G 3 0 37	1055	potash	Salzungen
	Wi 39	78 G 6 0 33	998	potash	Salzungen
	Wi 134	70 0 35	957	potash	Unterbreitsbach
	Wi 227	60 0 30	935	potash	Meuterode
	Wi 42	80 G 3 0 37	1074	potash	Limbach

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The following information has been extracted from the article "President of the Academy of Sciences, USSR, S.I. Vavilov". (Isvestiya Akademiya Nauk SSSR, Seriya Fizicheskaya, Vol IX, No 4 - 5, 1945).

SERGEY IVANOVICH VAVILOV

(a) Biographical Data.

1891	Born in Moscow. Educated at the Kommercheskoye Uchilishche. Interested in physics. Studied English, French, German, Italian.
1909	Entered Mathematics Department of Moscow University. Studied under Professor P. N. Lebedev.
1911	Lebedev and others resigned from the University as protest against policy of Minister of Education Kasso. Vavilov worked in Lebedev's private laboratory.
1912	Lebedev died. Vavilov studied under Professor P. P. Lazarev.
1914	Graduated. Refused opportunity to remain and study for a professorship in order to show his solidarity with professors who had resigned in 1911. Was conscripted and served 3½ years in various engineering units.
1915	Received gold medal for work of photochemistry which had been published during the previous year.
1918	Worked in X-Ray Section of Narkomzdrav. (People's Commissariat for Public Health).
1919	Passed master's examinations at Moscow State University. Became professor and occupied chair of general physics at Moscow State University until 1932.
1920 - 30	Professor of Moscow Higher Zootechnical Institute.
1922	In charge of Physical Optics Division of Narkomzdrav. Taught at Moscow Higher Technical School.
1926	Spent six months in Berlin, working with Professor P. Pringsheim (who later emigrated to America) on solid solutions of dyes at low temperatures.
1931	Elected Corresponding Member of Academy of Sciences, USSR.
1932	Elected Member of Academy of Sciences, USSR. Appointed Assistant Director of scientific side of the State Optical Institute. Moved from Moscow to Leningrad. Founded luminescence laboratory at the Institute. Appointed Director of Physico-Mathematical Institute. When the Academy of Sciences moved to Moscow, ~~the~~ separate Mathematical and Physical Institutes were formed. The latter received its present title (Physical Institute of the Academy of Sciences imeni P. N. Lebedev) and Vavilov became its director. Due almost entirely to his efforts, this institute is now one of the centers in the USSR for the study of atomic nuclei and cosmic radiation.

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1938	Elected as deputy of Supreme Soviet RSFSR.
1939	Received order of Labor Red Banner.
1932 - 39 approx.	Carried out considerable administrative work within the Academy-Member of Presidium for several years, Secretary of Physico-Mathematical Department, chairman of numerous committees.
1941 - 45	Worked on defence projects but continued theoretical research.
1943	Awarded Stalin Prize for work on light at small intensities. Received Order of Lenin for work at State Optical Institute.
1945	Received Order of Lenin for work at Academy of Sciences.

(b) Scientific Fields

The chief scientific interests of S. I. Vavilov are problems of physical optics - in particular, luminescence.

His early work in the X-Ray Section of Narkomzdrav was devoted to determining the limits within which Buge's Law of light absorption holds good. More important experiments were those carried out to ascertain the ratio between the energy of emission and the energy absorbed by solutions. Polarized luminescence was also studied by Vavilov during this period.

During his time at the Institute of Physics and Biophysics of Narkomzdrav, Vavilov was the center of scientific life. He gave lectures on the latest problems, reviewed Russian and foreign articles in the journal "Uspekhi fizicheskikh nauk", organized a special colloquium on physical optics, and wrote a book on relativity and many popular articles. To commemorate the bicentennial of Newton's death, Vavilov translated the "Optics" from the Latin and wrote a detailed commentary on it.

Under his leadership, the State Optical Institute carried out research on chemiluminescence, the application of luminescence analysis in the glass industry and other projects. Vavilov also devised a new method of studying luminescence, in conjunction with Brumberg and Timofeyeva.

At Moscow, together with Cherenkov, Frank, and Tamm, Vavilov investigated the luminescence produced when gamma rays pass through liquids. He also designed new types of luminescent lamps.

During the war Vavilov published a long paper on the theory of concentration extinguishing of luminescence. The phenomenon was examined as a manifestation of quantum mechanics resonance.

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Article concludes as follows:-

"The variety of Acad. S. I. Vavilov's work is clear from what has already been said. It includes physics and the associated fields and the history of science and philosophy. He values both the new theoretical ideas and important practical applications of the results of scientific investigations. S. I. Vavilov knows how to extract the essential and concentrate his attention on it; he takes pleasure in training new personnel and organising scientific activities; he is a great social worker and an outstanding scientist who loves his country and gives his strength unsparingly in its service. The election of S. I. Vavilov to the post of President of the Academy of Sciences was, therefore, a natural development in the distinguished career of a great scientist and a faithful citizen. We wish him success in his new and responsible post as the leader of Soviet science".

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